



DETERMINANTS OF FACTORS INFLUENCING MEDICATION ADHERENCE AMONG TUBERCULOSIS PATIENTS: A LITERATURE REVIEW

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ABSTRACT

Tuberculosis (TB) remains one of the leading causes of morbidity and mortality worldwide, particularly in developing countries. The success of therapy is highly dependent on patients' adherence to long-term treatment regimens. Non-adherence may lead to drug resistance, relapse, and treatment failure. Therefore, identifying factors that influence treatment adherence is crucial for designing effective interventions. This literature review aims to identify and analyze factors influencing medication adherence among tuberculosis patients based on empirical evidence from studies published between 2020 and 2025. The article search process followed the 2020 Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Searches were conducted across four reputable international databases: Scopus, Web of Science, ScienceDirect, and Google Scholar. Keywords used included ("tuberculosis" OR "TB") AND ("treatment adherence" OR "medication adherence" OR "treatment compliance") AND ("determinant factors" OR "associated factors" OR "predictors") AND ("patients"). Inclusion criteria consisted of original research articles employing cross-sectional or observational designs, involving active TB patients, and published in English between 2020 and 2025. Out of 1,610 identified articles, 410 duplicates were removed, leaving 1,200 articles for initial screening based on title and abstract. After full-text eligibility assessment of 180 articles, 16 studies met all criteria and were included in the final analysis. Findings from 16 studies revealed that TB medication adherence is influenced by sociodemographic, psychological, social support, and healthcare system factors. Family support and healthcare provider counseling were identified as the primary facilitators of adherence, although variations in sociocultural contexts across regions limit the generalizability of these findings. Medication adherence among TB patients is determined by patient-related, social, and healthcare system factors. Efforts to improve adherence require multidimensional approaches through education, psychosocial support, and community-based health service strengthening. These findings highlight the need for contextual and sustainable intervention strategies to optimize TB treatment outcomes.

Keywords: associated factors; determinant factors; medication adherence; patients; predictors; TB; treatment adherence; treatment compliance; tuberculosis

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INTRODUCTION

Tuberculosis (TB) remains one of the most persistent infectious diseases and continues to pose a major global health challenge, particularly in developing countries. According to the World Health Organization (WHO, 2023), approximately 10 million people worldwide are infected with TB each year, resulting in more than 1.5 million deaths (Estaji et al., 2025). The success of TB treatment largely depends on patients' adherence to long-term therapy, which typically lasts between six and nine months under standard regimens. Non-adherence not only increases the risk of treatment failure but also contributes to drug resistance, relapse, and disease transmission within the community (Y. Chen et al., 2023). Treatment adherence in TB is influenced by a wide range of complex and multidimensional factors, including sociodemographic factors such as age, education, and socioeconomic status; psychological factors such as motivation, stigma, and knowledge about TB; social support; and healthcare system factors, including access to health facilities, quality of

interactions with healthcare professionals, and continuity of care. These factors vary across regions and cultural contexts, posing significant challenges to implementing effective adherence-enhancement strategies (Gashu et al., 2021).

Several studies have attempted to identify determinants of tuberculosis (TB) treatment adherence; however, significant gaps remain regarding which factors exert the greatest influence across both local and global contexts. Existing evidence is often geographically restricted, based on small sample sizes, or lacks methodological rigor, thereby limiting the generalizability and applicability of the findings. Given the persistent challenge of non-adherence and its contribution to drug resistance, treatment failure, and increased transmission, conducting a comprehensive and updated synthesis of evidence is crucial to guide targeted interventions and policy decisions.

Therefore, a systematic literature review focusing on recent cross-sectional studies published between 2020 and 2025 is essential to capture the most current determinants affecting medication adherence among TB patients. The novelty of this review lies in its exclusive emphasis on contemporary post-pandemic evidence, its comparative analysis between high-burden and low-burden settings, and its integration of patient-related, health system-related, and socio-environmental factors into a unified conceptual framework an approach that has been largely absent in prior reviews. This provides a more holistic and actionable understanding of adherence determinants, supporting the development of evidence-based strategies to improve TB treatment outcomes. This review aims to analyze the determinants of TB treatment adherence based on empirical evidence from recent studies and to provide a comprehensive understanding of the patient-related, social, and health system factors that shape adherence behavior. The findings are expected to serve as a basis for developing targeted, effective, and sustainable interventions to improve treatment adherence in various contexts.

METHOD

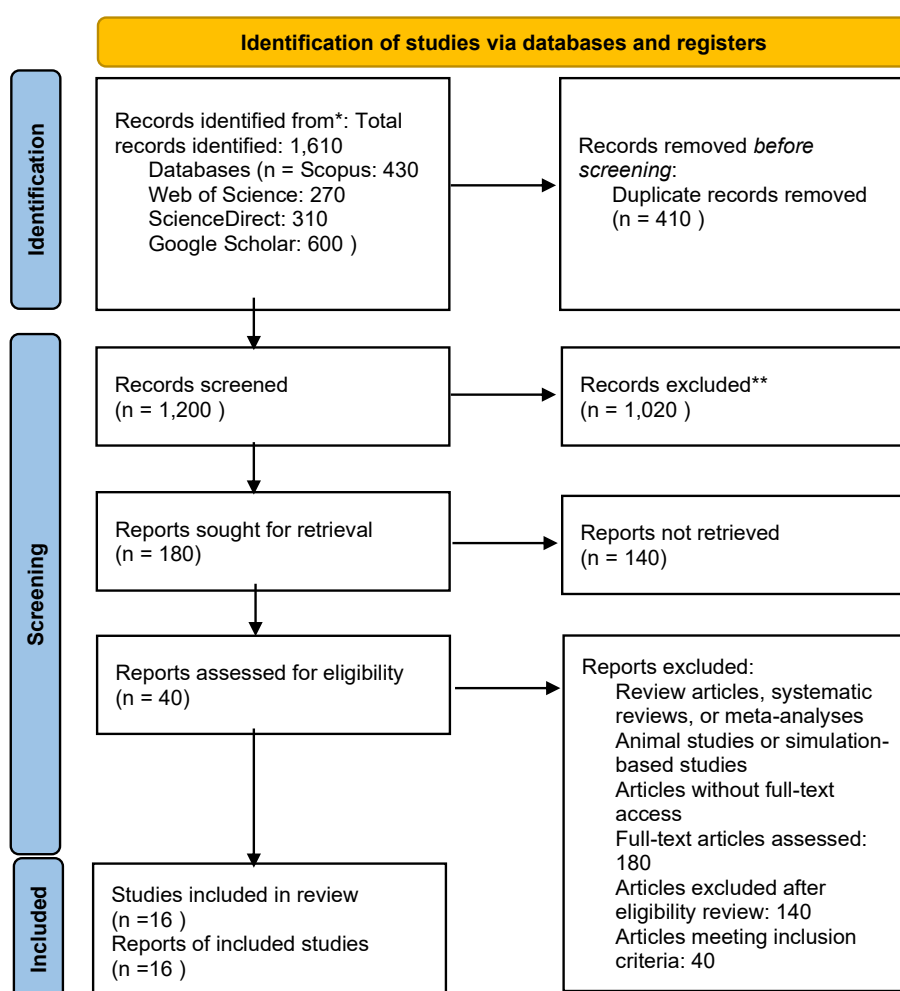
This study employed a systematic literature review design, with article searches conducted systematically using Boolean operators (AND, OR) and quotation marks to refine search accuracy. The search keywords included ("tuberculosis" OR "TB") AND ("treatment adherence" OR "medication adherence" OR "treatment compliance") AND ("determinant factors" OR "associated factors" OR "predictors") AND ("patients"). The search was limited to articles published between 2020 and 2025, written in English, categorized as original research, involving TB patients as the study population, and employing cross-sectional or observational study designs. Searches were carried out through four reputable international databases: Scopus, Web of Science, ScienceDirect, and Google Scholar. The initial search identified 430 articles from Scopus, 270 from Web of Science, 310 from ScienceDirect, and 600 from Google Scholar, resulting in a total of 1,610 articles. During the screening stage, duplicate articles (n = 410) were removed, leaving 1,200 unique records. These articles were screened based on title and abstract to ensure their relevance to the research focus on TB treatment adherence. After this stage, 180 articles were deemed potentially relevant for further review.

In the eligibility stage, the full texts of these 180 articles were reviewed in detail. Inclusion and exclusion criteria were applied to ensure methodological rigor. Inclusion criteria: (1) quantitative studies with cross-sectional designs; (2) populations of active TB patients (pulmonary or extrapulmonary); (3) main variables assessing treatment adherence or non-adherence; and (4) publications in peer-reviewed journals between 2020–2025. Exclusion criteria: (1) review articles, systematic reviews, or meta-analyses; (2) studies involving animal models or simulations; and (3) articles without full-text access. After applying these criteria, 40 articles met the inclusion requirements, while 140 articles were excluded for not addressing determinant factors or not involving TB patient populations. Finally, during the inclusion stage, a final selection was made based on the contextual relevance and methodological strength of the studies. As a result, 16

original research articles (2020–2025) that fully met the eligibility criteria were retained and included in the review matrix for further analysis of factors influencing medication adherence among tuberculosis patients.

Table 1.
PICO Framework

Component	Description
P (Population)	Active tuberculosis (TB) patients both pulmonary and extrapulmonary across various age groups and genders who are undergoing standard TB treatment regimens.
I (Intervention / Exposure)	Factors potentially influencing TB medication adherence, including: 1. Sociodemographic factors: age, education, occupation, socioeconomic status. 2. Psychological factors: stigma, motivation, knowledge about TB. 3. Social support factors: family and community support. 4. Health system factors: access to healthcare facilities, quality of services, and patient provider relationships.
C (Comparison)	TB patients with differing levels of adherence (adherent vs. non-adherent), or those exposed to specific determinant factors compared to those unexposed.
O (Outcome)	TB medication adherence, measured through: Adherence or non-adherence rate. 1. Duration or completion of treatment. 2. The influence of determinant factors on adherence outcomes.



Pcture 1. PRISMA Flowchart 2020

RESULT

From the 16 cross-sectional studies included in the analysis, it was found that tuberculosis (TB) treatment adherence is influenced by a wide range of multidimensional factors. Sociodemographic factors such as age, education level, and socioeconomic status were consistently associated with adherence levels, where younger patients, those with lower educational attainment, and individuals

with lower income tended to exhibit poorer adherence. Psychological factors, including stigma, motivation, and knowledge about TB, also played a significant role. Patients with better understanding of the disease and its treatment demonstrated higher levels of adherence. Furthermore, social support from family members and community networks was shown to enhance adherence, underscoring the importance of a supportive psychosocial environment.

Health system factors, such as distance to healthcare facilities, quality of patient–provider interactions, and continuity of care, were also identified as key determinants influencing patients’ adherence behavior. Several studies emphasized that the combined effects of internal and external factors vary across regions, indicating that intervention strategies should be tailored to local sociocultural and healthcare contexts. Overall, these findings highlight that improving TB treatment adherence requires a multidimensional approach, integrating patient education, psychosocial support, and the strengthening of community-based healthcare systems.

Table 2.
Analysis Article

No	Title	Author (Year)	Objective	Population / Sample	Method	Main Findings	Research Gap / Limitation
1	<i>The effects of family, society and national policy support on treatment adherence among newly diagnosed tuberculosis patients: a cross-sectional study</i>	X. Chen et al. (2020)	To evaluate the level of adherence and the influence of family, social, and national policy support among newly diagnosed TB patients in China.	481 newly diagnosed TB patients in Dalian, China.	Cross-sectional survey + ordinal logistic regression.	45.7% showed good adherence; factors such as family supervision, doctor–patient relationship, and TB knowledge improved adherence; higher education and drug side effects reduced it.	Conducted in a single city; requires generalization to other regions and broader settings.
2	<i>Assessment of Non-Adherence to Anti-TB Drugs and Associated Factors Among Patients Attending TB Treatment Centers During COVID-19 Pandemic in Mogadishu, Somalia: A Cross-Sectional Study</i>	Omar et al. (2024)	To assess the rate of non-adherence and associated factors during the first wave of COVID-19 in Somalia.	255 TB patients from three treatment centers in Mogadishu.	Cross-sectional survey + binary logistic regression.	Non-adherence rate: 34.5%; significant factors included age (25–34 & 35–44 years), unemployment, smoking, distance to health facility, and continuation phase.	COVID-19–specific context may differ under normal conditions; limited to one city.
3	<i>Level of and associated factors for non-adherence to anti-tuberculosis treatment among tuberculosis patients in Gamo Gofa Zone, Southern Ethiopia: Cross-sectional study</i>	Ajema et al. (2020)	To measure non-adherence levels and associated factors in Gamo Gofa Zone.	289 TB patients under treatment in the zone.	Cross-sectional survey + multivariable logistic regression.	Non-adherence ≈ 16.5%; significant factors: not disclosing TB status to family, lack of side effect information, previous TB history, and smoking.	Data collected earlier (2017) but published in 2020; limited generalizability; focused on one zone only.

No	Title	Author (Year)	Objective	Population / Sample	Method	Main Findings	Research Gap / Limitation
4	<i>Factors influencing adherence to antituberculosis treatment: A cross-sectional study at Sendang Agung Health Center, Central Lampung</i>	Nabila et al. (2024)	To identify factors influencing TB treatment adherence in Lampung, Indonesia.	53 TB patients (Jan–Mar 2023) at one health center.	Cross-sectional survey + Chi-square and logistic regression.	Adherence rate 62.3%; significant factors: patient knowledge and duration of therapy.	Small sample size (n=53); single health facility; limited generalizability.
5	<i>Medication nonadherence and associated factors in patients with tuberculosis in Wau, South Sudan: A cross-sectional study using the WHO multidimensional adherence model</i>	Marin et al. (2024)	To assess non-adherence and related factors in Wau, South Sudan, using the WHO multidimensional adherence model.	234 first-line TB regimen patients.	Cross-sectional survey + urine isoniazid metabolite + modified Poisson regression.	Non-adherence 24.8%; contributing factors: symptom relief, alcohol consumption, long waiting times at health facilities.	Conducted in a low-resource setting; calls for interventional studies after factor identification.
6	<i>Determinants of adherence to anti-TB treatment and associated factors among adult TB patients in Gondar City Administration, Northwest Ethiopia: Based on Health Belief Model perspective</i>	Gebremariam et al. (2021)	To assess adherence and associated factors using the Health Belief Model (HBM) framework.	Adult TB patients at health facilities in Gondar, Ethiopia (Feb–Mar 2020).	Institution-based cross-sectional survey.	Significant factors: perceived susceptibility, perceived benefits, and self-efficacy regarding adherence.	Focused on one theoretical model (HBM); limited inclusion of health system factors.
7	<i>Adherence to TB treatment remains low during continuation phase among adult patients in Northwest Ethiopia</i>	Gashu et al. (2021)	To determine adherence levels and determinants among adult TB patients during the continuation phase.	307 TB patients from 22 health facilities in Ethiopia.	Cross-sectional quantitative study + logistic regression analysis.	Adherence 64.2%; significant factors: secondary education, provider–patient relationship, TB knowledge, and medium family wealth.	Focused only on continuation phase; interventional studies recommended.
8	<i>Barriers to tuberculosis treatment adherence in high-burden settings (Ashanti, Ghana)</i>	Appiah et al. (2023)	To explore barriers to TB treatment adherence in a high-burden area.	TB patients at primary care facilities in Ashanti, Ghana.	Mixed-methods (cross-sectional + qualitative interviews).	Main barriers: stigma, transportation costs, side effects, and distance to health facilities.	Limited cross-regional comparison; requires context-specific interventions.
9	<i>Non-adherence to anti-TB treatment and associated factors (Hosanna, Ethiopia)</i>	Lemma Tirore et al. (2024)	To estimate non-adherence prevalence and associated factors.	TB patients in public facilities in Hosanna.	Analytical cross-sectional study.	Non-adherence 18%; associated factors: low education, side effects, and irregular visits.	Localized study; limited generalizability to other contexts.

No	Title	Author (Year)	Objective	Population / Sample	Method	Main Findings	Research Gap / Limitation
10	<i>Adherence and associated factors of treatment regimen (South Korea)</i>	Bea et al. (2021)	To assess correlates of TB treatment adherence.	TB patients in South Korea (medical records and interviews).	Cross-sectional analytical study.	Significant factors: socioeconomic status, family support, and health literacy.	Lacks longitudinal analysis to assess adherence changes over time.
11	<i>Evaluation of adherence during the early phase of TB treatment</i>	Ozaltun et al. (2024))	To evaluate determinants of adherence in the early treatment phase.	Newly diagnosed TB patients (clinical sample).	Observational cross-sectional study.	Treatment complexity, forgetfulness, and stigma decreased adherence.	Calls for interventional studies targeting early-phase determinants.
12	<i>Factors related to complying with anti-TB medications in Indonesia</i>	Yani et al. (2022)	To identify factors influencing TB medication adherence in Indonesia.	TB patients in Indonesia (primary data).	Cross-sectional descriptive /analytical study.	Key factors: knowledge, cost, access, and family support; COVID-19 negatively affected adherence.	Local study; national-level representative survey recommended.
13	<i>Facilitators and barriers to uptake of digital adherence technologies (Ethiopia)</i>	Shewamene et al. (2024)	To explore factors affecting the adoption of digital adherence technologies (DATs).	Stakeholders: TB patients, healthcare workers, and policymakers in Ethiopia.	Qualitative (FGD and interviews)	Adoption factors: digital literacy, network infrastructure, user trust.	Needs large-scale implementation evidence and long-term patient outcomes.
14	<i>Social support, quality of care and adherence (Lima, Peru)</i>	Dilas et al. (2023)	To examine the mediating role of health education between social support and adherence.	162 TB patients, Lima, Peru.	Cross-sectional, Structural Equation Modeling (SEM, SmartPLS)	Health education mediates the relationship between social support and adherence.	Small sample; family-based intervention trials recommended.
15	<i>Factors contributing to pulmonary TB treatment non-adherence</i>	OPPERMAN et al. (2023)	To map factors contributing to non-adherence among TB patients.	TB patients (various settings).	Cross-sectional literature + secondary data.	Determinants included personal, social, economic, and healthcare-related aspects.	Calls for interventional research addressing specific causal mechanisms.
16	<i>Patient adherence to TB treatment in the Indian context</i>	Shringarpure et al. (2023)	To identify patient characteristics associated with adherence in India.	TB patients from multiple centers in India.	Cross-sectional / secondary data analysis.	Significant factors: age, education, employment status, stigma.	Lack of long-term behavioral analysis and evaluation of local interventions.

DISCUSSION

This review identifies a complex and multifactorial set of determinants influencing tuberculosis (TB) medication adherence across diverse contexts. Patient-related factors consistently emerged as strong predictors of adherence. Younger adults, individuals with low education levels, and those with poor TB knowledge showed significantly higher risks of non-adherence, as

demonstrated in studies conducted in China, Ethiopia, Indonesia, and India (Chen et al., 2020; Ajema et al., 2020; Yani et al., 2022; Shringarpure et al., 2023). Behavioral risks such as smoking and alcohol consumption further exacerbated non-adherence, particularly in Somalia, Ethiopia, and South Sudan (Omar et al., 2024; Ajema et al., 2020; Marin et al., 2024). Stigma reported especially in Ghana, Turkey, and India was a persistent psychological barrier that discouraged patients from attending treatment visits and disclosing their TB status (Appiah et al., 2023; Ozaltun et al., 2024; Shringarpure et al., 2023).

Therapy-related factors also played a central role in adherence outcomes. Drug side effects were one of the most frequently reported determinants of non-adherence, appearing in studies from China, Ethiopia, Ghana, and South Sudan (Chen et al., 2020; Ajema et al., 2020; Appiah et al., 2023; Marin et al., 2024). Challenges differed by treatment phase; adherence commonly declined during the continuation phase, as shown in Ethiopia (Gashu et al., 2021), whereas early-phase adherence was influenced by treatment complexity, forgetfulness, and fear of stigma (Ozaltun et al., 2024). These findings highlight the need for phase-specific adherence interventions, including proactive counseling on expected side effects and ongoing motivational support.

Health-system related determinants were consistently identified as critical contributors to treatment adherence, underscoring the importance of strengthening community-based healthcare systems. Positive patient provider relationships, effective communication, and structured health education improved adherence in China, Ethiopia, and South Korea (Chen et al., 2020; Gebremariam et al., 2021; Bea et al., 2021). Conversely, long waiting times, service delays, and inadequate facility capacity contributed to treatment interruption in South Sudan and Ghana (Marin et al., 2024; Appiah et al., 2023). Distance to health facilities and transportation barriers were major obstacles in Somalia and Ghana (Omar et al., 2024; Appiah et al., 2023), reflecting how geographical inequities within primary health systems disproportionately affect vulnerable patients.

The role of social and family support also emerged as an essential facilitator of adherence. Strong family engagement improved adherence outcomes in China, South Korea, and Peru (Chen et al., 2020; Bea et al., 2021; Dilas et al., 2023). In contrast, non-disclosure of TB status to family members significantly increased the risk of non-adherence in Ethiopia (Ajema et al., 2020). Stigma within community settings remained a strong negative determinant, particularly in Ghana and India (Appiah et al., 2023; Shringarpure et al., 2023). These findings point to the necessity of integrating family-centered counseling, community mobilization, and stigma-reduction strategies into TB programs especially in high-burden settings.

Economic and accessibility factors were another dominant theme. Low income, unemployment, and inability to afford transportation were repeatedly identified as significant predictors of non-adherence in Somalia, Ghana, and India (Omar et al., 2024; Appiah et al., 2023; Shringarpure et al., 2023). Distance to health facilities was also a consistent barrier in Somalia and Ghana (Omar et al., 2024; Appiah et al., 2023). These findings emphasize the need for socioeconomic support mechanisms including transportation subsidies, community DOTS expansion, and decentralization of TB services to improve access and reduce inequities.

The review also highlights the impact of national policies and global events on adherence. For instance, national policy support in China positively influenced patient adherence (Chen et al., 2020), while the COVID-19 pandemic significantly disrupted treatment continuity due to mobility restrictions, fear of infection, and interruptions in TB service delivery in Indonesia and Somalia (Yani et al., 2022; Omar et al., 2024). These disruptions underscore the need for resilient community-based systems capable of maintaining treatment services during emergencies.

Emerging evidence on digital adherence technologies (DATs) offers new insights into future intervention pathways. However, adoption remains limited due to digital illiteracy, poor network infrastructure, and low user trust, as reported in Ethiopia (Shewamene et al., 2024). Although DATs hold promise, their success depends on community engagement, capacity building, and system-level readiness rather than technology alone.

Across the included studies, several methodological gaps are apparent. Many studies were conducted in single countries or individual facilities, limiting generalizability (Nabila et al., 2024; Tirore et al., 2024). Sample sizes in several studies were relatively small (e.g., Peru and Lampung) (Dilas et al., 2023; Nabila et al., 2024). Additionally, the widespread use of cross-sectional designs restricts causal inference, and few studies integrated multilevel analyses or assessed changes in adherence over time. These gaps highlight the need for robust interventional, longitudinal, and multi-setting research to better understand adherence determinants in varied contexts.

Collectively, the findings demonstrate that improving TB medication adherence requires strengthening community-based healthcare systems through integrated strategies. These include empowering community health workers, enhancing health education, fostering family involvement, expanding access to DOTS services, improving geographic accessibility, and supporting the adoption of digital adherence technologies. Interventions must be context-responsive and grounded in community realities to achieve sustained adherence and improved TB treatment outcomes.

CONCLUSION

Overall, TB treatment adherence is influenced by a combination of personal, social, healthcare access, pharmacological, and situational factors, including those related to the COVID-19 pandemic. The evidence consistently underscores the need for multidimensional interventions, particularly those focusing on patient education, family and community support, and the use of technological reminder systems. Efforts to improve adherence must be context-specific, sustainable, and evidence-driven to prevent drug resistance and optimize treatment outcomes for TB patients.

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